United States Department of the Interior
GEOLOGICAL SURVEY

Illustrations of plant microfossils from the Morrison Formation

II. Plant Microfossils from the Westwater Canyon Member

by

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This report is preliminary and has not been reviewed for conformity with U. S. Geological Survey editorial standards.

This report makes available photographs of the palynomorphs found in the productive samples from the Westwater Canyon Member of the Morrison Formation, which is part of continuing efforts to provide biostratigraphical data from critical rock sequences. The photographs are primarily for laboratory reference, to be used only as a guide to the recognition and preliminary identification of pollen and spores from the Morrison Formation. The authors have relied primarily on the published reports included in the bibliography appended to the first report: " I. Plant Microfossils from the Brushy Basin Member. (U.S. Geological Survey Opem File Report 81-35"). No new genera or species are described, nor have attempts been made to bring the nomenclature up to date. This report is not intended as a formal taxonomic documentation and treatment.

The spores and pollen illustrated were obtained from surface samples from the following localities:

U. S. G. S. PALEOBOTANY LOCALITY NO.	LOCALITY
D4927	SE¼ sec. 5, T. 15 N., R. 16 W., Church Rock Quadrangle, McKinley Co., New Mexico. Dark to medium-gray carbonaceous shale. Sample taken 0.61 m above 1.2-m shale bed at base of Westwater Canyon Member of Morrison Formation. Collected by M. W. Green and J. F. Robertson, Field no. FE-1-G72.
D4931-A	SE¼ SE¼ sec. 2, T. 15 N., R. 16 W., Pinedale Quadrangle, McKinley Co., New Mexico. Medium-dark-gray claystone within variegated colored shale and siltstone 1 m above "yellow" sandstone at contact (?) between Recapture and Westwater Canyon Members of the Morrison.

Collected by M. W. Green and J. F. Robertson, Field no. P18R72b.

These localities are shown on the accompanying map (fig. 1).

All specimens illustrated in this report are preserved on slides deposited in the paleobotanical collections of the U. S. Geological Survey, Denver, Colo. The specimens may be located on the slides by the mechanical stage coordinates given in the plate explanations. In order that others may convert their mechanical stage readings to those recorded for the specimens included in this report, the coordinates for the center point of a 1 x 3-inch standard microscope slide are 108.0 x 12.3 mm. The method of accurately locating the center of a standard microscope slide has been described by R. H. Tschudy (1966, p. D78). With the slide label to the left, the vertical coordinates decrease toward the near edge of the slide, and the horizontal coordinates decrease toward the right edge of the slide.

The palynomorphs found are shown on plates 1-9.

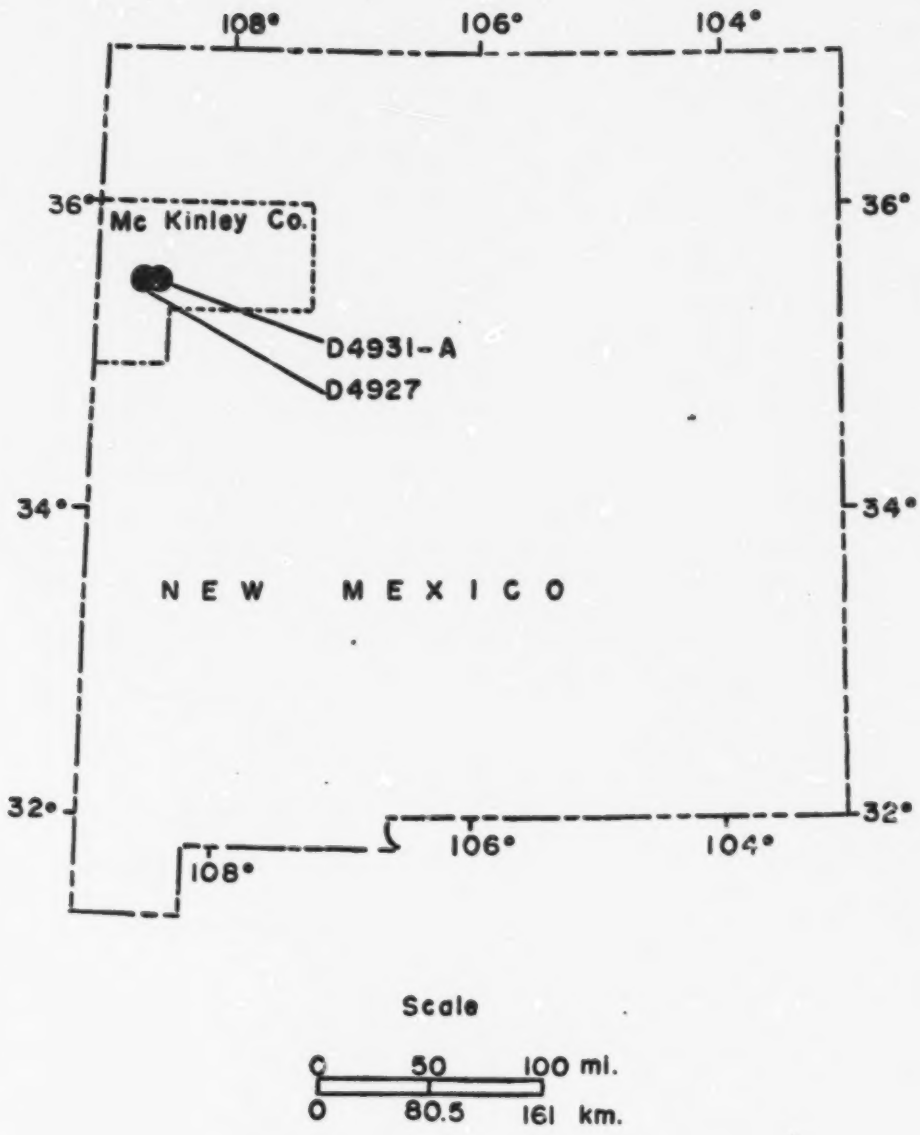


Figure 1 - map showing Westwater Canyon sample localities.

Plate 1

[Magnification X 1000]

Figure 1. Cyathidites australis Couper, 1953. Sample D4927, slide 24, coordinates 117.9 x 9.2.

2. Trilete spore - undetermined. Sample D4927, slide 17, coordinates 105.4 x 14.5.

3. Todisporites? Sample D4927, slide 24, coordinates 107.6 x 19.3.

4. Trilete spore - undetermined. Sample D4927, slide 10, coordinates 105.5 x 11.3.

5. Baculatisporites comaumensis (Cookson) Potonie 1956. Sample D4927, slide 17, coordinates 95.7 x 11.6.

6. Neveisporites radiatus (Chlonova) Srivastava 1972. Sample D4927, slide 17, coordinates 114.8 x 18.8.

7. Neveisporites radiatus (Chlonova) Srivastava 1972. Sample D4927, slide 10, coordinates 95.8x 4.8.

8. Trilete spore - unidentified. Sample D4927, slide 23, coordinates 81.7 x 13.5.

9. Trilete spore - unidentified. Sample D4927, slide 17, coordinates 103.2 x 11.0.

10. Couperisporites jurassicus Pocock 1970. Sample D4927, slide 24, coordinates 95.0 x 19.2.

11 Neveisporites radiatus (Chlonova) Srivastava 1972. Sample D4927, slide 17, coordinates 80.5 x 13.7.

12. Ceratosporites couliensis Srivastava 1972. Sample D4927, slide 17, coordinates 101.6 x 18.1.

13. Ceratosporites couliensis Srivastava 1972. Sample D4927, slide 24, coordinates 112.3 x 11.5.

14. Ceratosporites couliensis Srivastava 1972. Sample D4927, slide 23, coordinates 110.4 x 3.4.

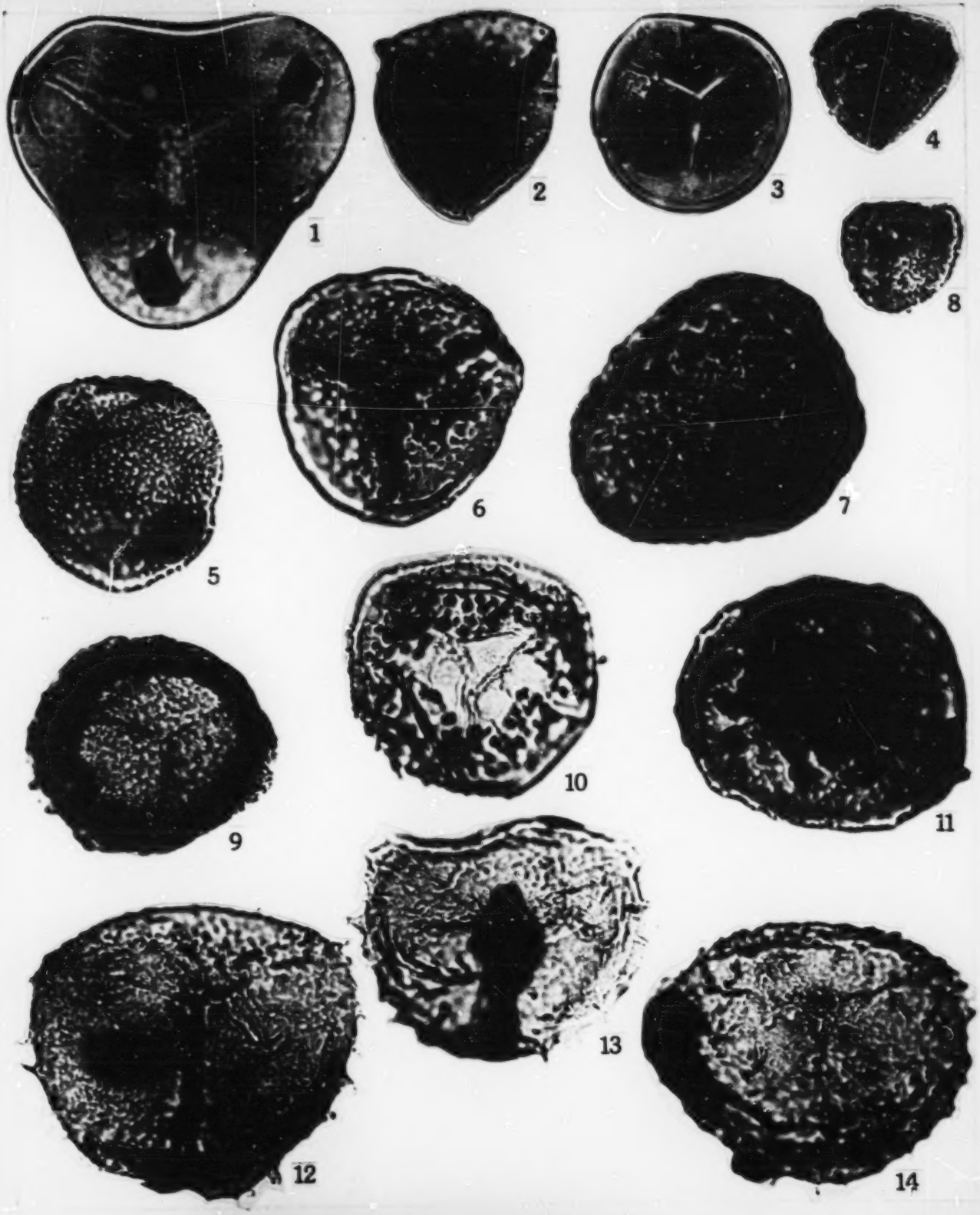


Plate 1

Plate 2

[Magnification X 1000]

Figure 1. Ceratosporites? Sample D4927, slide 31, coordinates 112.3 x 10.0.

2. Lycopodium cf. L. crassimacerius Hedlund 1966. Sample D4927, slide 10, coordinates 91.2 x 8.8.

3. Lycopodiumsporites sp. Sample D4927, slide 24, coordinates 111.1 x 16.4.

4. Bisaccate pollen - undetermined. Sample D4927, slide 17, coordinates 98.2 x 5.0.

5. Bisaccate pollen - undetermined. Sample D4927, slide 10, coordinates 116.0 x 4.1.

6. Pristinuspollenites microsaccus (Couper) B. Tschudy 1973. Sample D4927, slide 17, coordinates 107.2 x 15.2.

7. Alisporites grandis (Cookson) Dettmann 1963. Sample D4927, slide 10, coordinates 96.0 x 8.0.

8. Alisporites grandis (Cookson) Dettmann 1963. Sample D4927, slide 10, coordinates 84.4 x 18.3.

9. Bisaccate pollen - unidentified. Sample D4927, slide 17, coordinates 108.3 x 20.3.

10. Bisaccate pollen - unidentified. Sample D4927, slide 10, coordinates 87.2 x 15.4.

11. Bisaccate pollen - unidentified. Sample D4927, slide 23, coordinates 91.3 x 19.7.

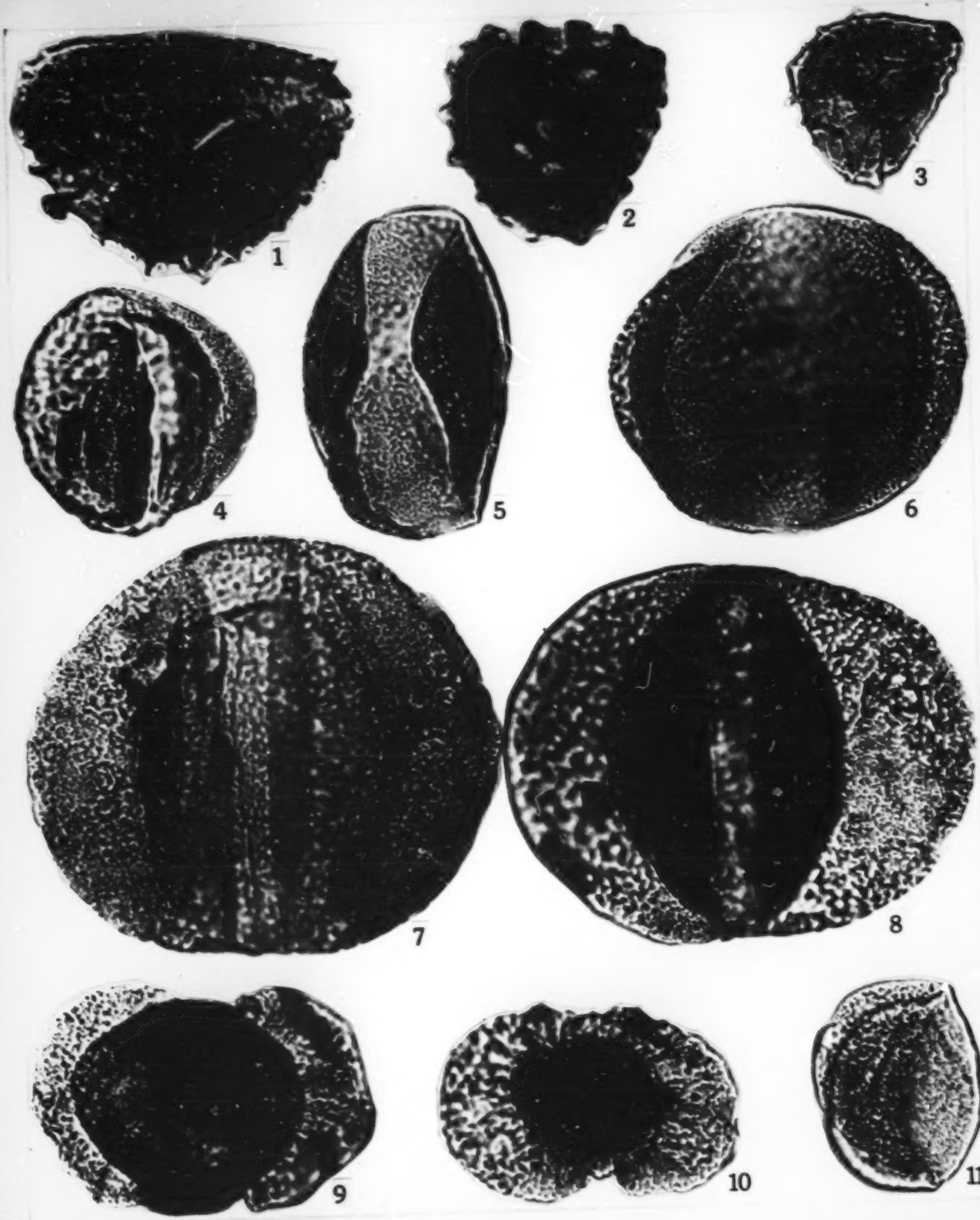


Plate 2

Plate 3

[Magnification X 1000]

Figure 1-2. Bisaccate pollen - unidentified. Sample D4927, slide 17, coordinates 92.0 x 18.4.

3. cf. Cedripites canadensis Pocock 1962. Sample D4927, slide 23, coordinates 106.0 x 21.1.
4. Bisaccate pollen - unidentified. Sample D4927, slide 10, coordinates 80.3 x 4.8.
5. Bisaccate pollen - unidentified. Sample D4927, slide 17, coordinates 113.2 x 10.5.
6. Pseudowalchia ovalis Pocock 1970. Sample D4927, slide 10, coordinates 83.7 x 16.0.
7. Bisaccate pollen - unidentified. Sample D4927, slide 17, coordinates 95.8 x 15.3.
8. Araucariacites australis Cookson 1947. Sample D4927, slide 10, coordinates 88.3 x 15.3.
9. Araucariacites australis Cookson 1947. Sample D4927, slide 17, coordinates 84.2 x 6.3.
10. Araucariacites australis Cookson 1947. Sample D4927, slide 23, coordinates 88.0 x 2.5.

Plate 3

Plate 4

[Magnification X 1000]

Figure 1 cf. Callialasporites trilobatus (Balme) Sukh Dev 1961. Sample D4927, slide 23, coordinates 93.6 x 1.8.

2. Callialasporites? Sample D4927, slide 10, coordinates 86.6 x 15.2.

3. Undetermined. Sample D4927, slide 23, coordinates 94.9 x 10.0.

4. Callialasporites segmentatus (Balme) Sukh Dev 1961. Sample D4927, slide 31, coordinates 109.3 x 14.5.

5. Cerebropollenites macroverrucosus (Thiergart) Pocock 1970. Sample D4927, slide 10, coordinates 98.3 x 11.0.

6. Cerebropollenites mesozoicus (Couper) Nilsson 1958. Sample D4927, slide 24, coordinates 90.5 x 20.2.

7. Undetermined. Sample D4927, slide 31, coordinates 80.3 x 8.0.

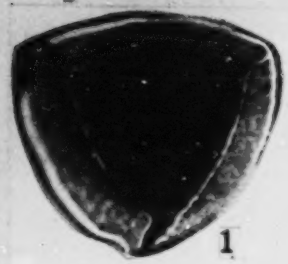
8. Equisetosporites sp. Sample D4927, slide 10, coordinates 96.4 x 22.2.

9. Cycadopites parvus (Bolkhovetina) Pocock 1970. Sample D4927, slide 10, coordinates 98.0 x 13.4.

10. Corollina sp. Sample D4927, slide 17, coordinates 79.8 x 4.7.

11. Eucommiidites troedssonii Erdtman 1948. Sample D4927, slide 17, coordinates 110.0 x 15.4.

12. Cycadopites fragilis Singh 1964. Sample D4927, slide 10, coordinates 92.3 x 2.6.



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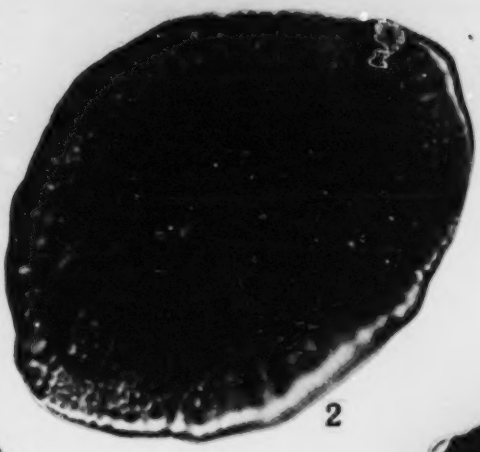

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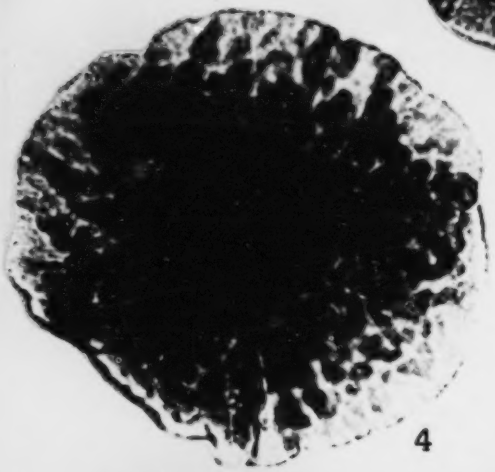

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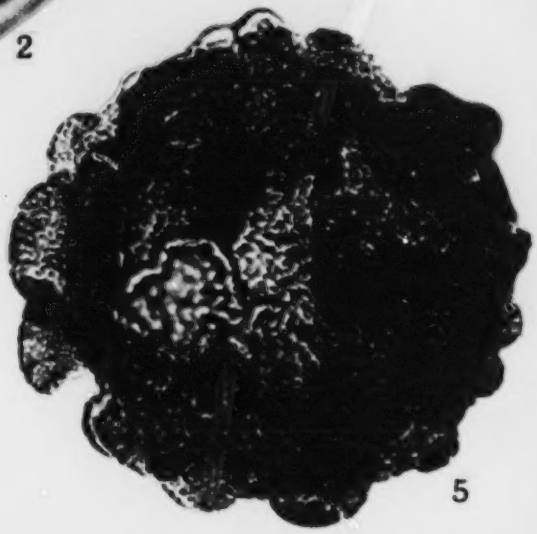

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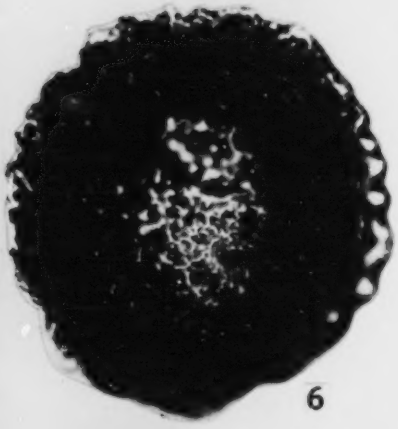

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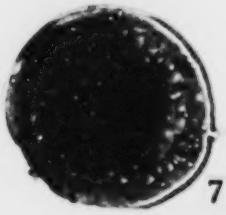

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Plate 4

Plate 5

[Magnification X 1000]

Figure 1. Trilete spore - undetermined. Sample D4931-A, slide 8, coordinates 114.4 x 17.7.

2. Trilete spore - undetermined, high focus. Sample D4931-A, slide 1, coordinates 92.6 x 14.2.

3. Trilete spore - undetermined. Same grain as fig. 2, low focus. Sample D4931-A, slide 1, coordinates 92.6 x 14.2.

4. Stereisporites sp., Sample D4931-A, slide 8, coordinates 113.2 x 6.7.

5. Trilete spore - undetermined. Sample D4931-A, slide 8, coordinates 110.2 x 20.1

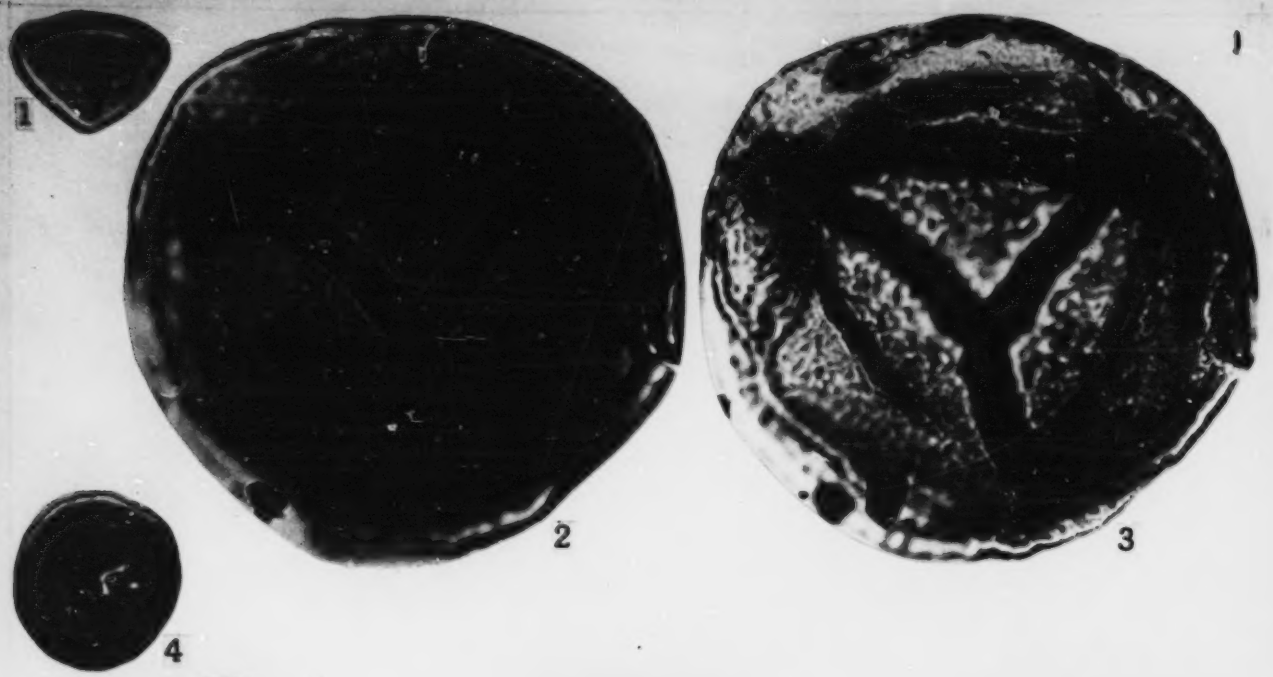
6. Distaltriangulisporis sp., Sample D4931-A, slide 9, coordinates 100.6 x 3.0.

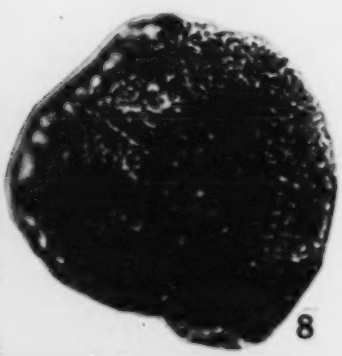
7. Distaltriangulisporis sp., Sample D4931-A, slide 9, coordinates 109.0 x 10.2.

8. Osmundacidites wellmanii Couper, 1953. Sample D4931-A, slide 8, coordinates 100.5 x 10.2.

9. Leptolepidites major Couper, 1958. Sample D4931-A, slide 8, coordinates 108.0 x 3.1.

10. Callialasporites sp. Sample D4931-A, slide 9, coordinates 83.3 x 9.4.





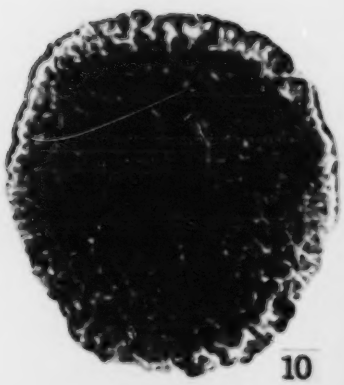


Plate 5

Plate 6

[Magnification X 1000]

Figure 1. Alisporites sp. Sample D4931-A, slide 1, coordinates 104.7 x 15.5.

2. Bisaccate pollen - undetermined. Sample D4931-A, slide 8, coordinates 103.7 x 6.3.

3. Pristinuspollenites microsaccus (Couper) Tschudy, 1973. Sample D4931-A, slide 1, coordinates 98.7 x 9.5.

4. Bisaccate pollen - undetermined. Sample D4931-A, slide 8, coordinates 106.2 x 5.1.

5. Bisaccate pollen - undetermined. Sample D4931-A, slide 9, coordinates 111.3 x 20.2.

6. Vitreisporites pallidus (Reissinger) Nilsson, 1958. Sample D4931-A, slide 1, coordinates 82.0 x 7.3.

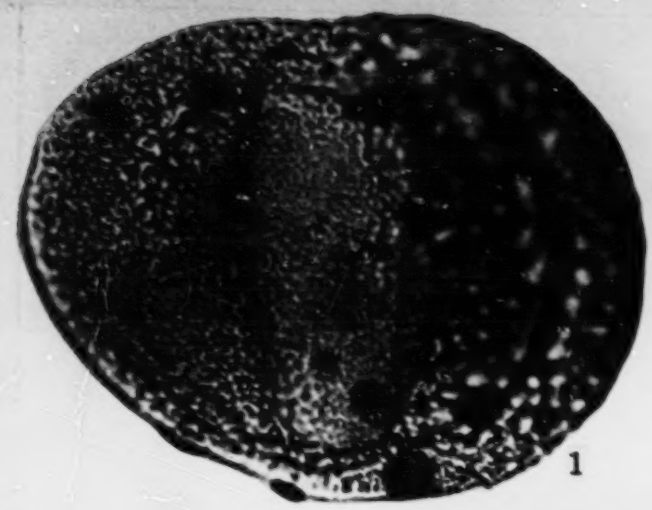
7. Podocarpidites sp. Sample D4931-A, slide 8, coordinates 86.7 x 13.9.

8. Bisaccate pollen - undetermined. Sample D4931-A, slide 1, coordinates 107.8 x 17.5.

9. Rugubivesiculites sp. Sample D4931-A, slide 8, coordinates 113.2 x 16.0.

10. Undetermined. Sample D4931-A, slide 8, coordinates 100.8 x 7.3.

11. Callialasporites trilobatus (Balme) Sukh Dev, 1964. Sample D4931-A, slide 9, coordinates 80.9 x 14.3.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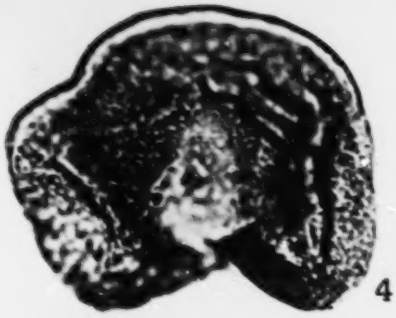
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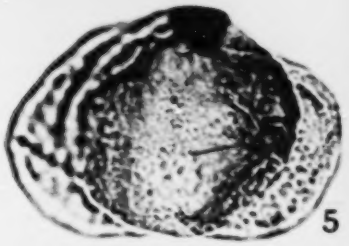
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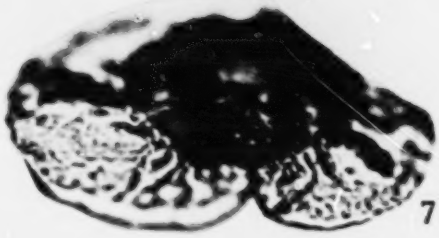
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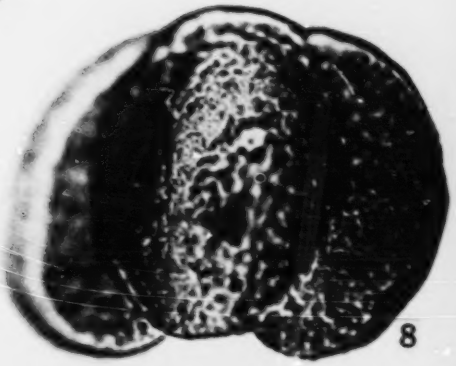
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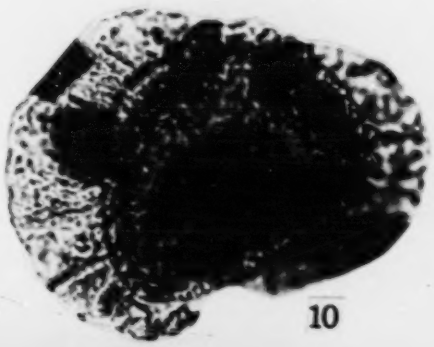
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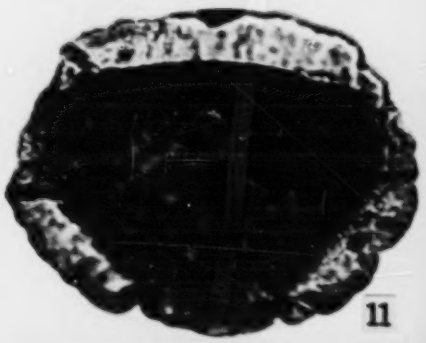
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Plate 6

Plate 7

[Magnification X 1000]

Figure 1. Callialasporites sp. Sample D4931-A, slide 8, coordinates 89.7 x 12.7.

2. Callialasporites sp. Sample D4931-A, slide 8, coordinates 105.7 x 5.0.

3. Callialasporites segmentatus (Balme) Sukh Dev, 1961. Sample D4931-A, slide 2, coordinates 104.2 x 8.2.

4. Callialasporites sp. Sample D4931-A, slide 8, coordinates 113.9 x 4.5.

5. Unidentified. Sample D4931-A, slide 8, coordinates 78.0 x 12.0.

6. Cerebropollenites macroverrucosus (Thiergart) Pocock, 1970. Sample D4931-A, slide 1, coordinates 80.0 x 8.8.

7. Callialasporites sp. Sample D4931-A, slide 1, coordinates 105.1 x 13.1.

8. Callialasporites sp. Sample D4931-A, slide 1, coordinates 108.7 x 14.8.

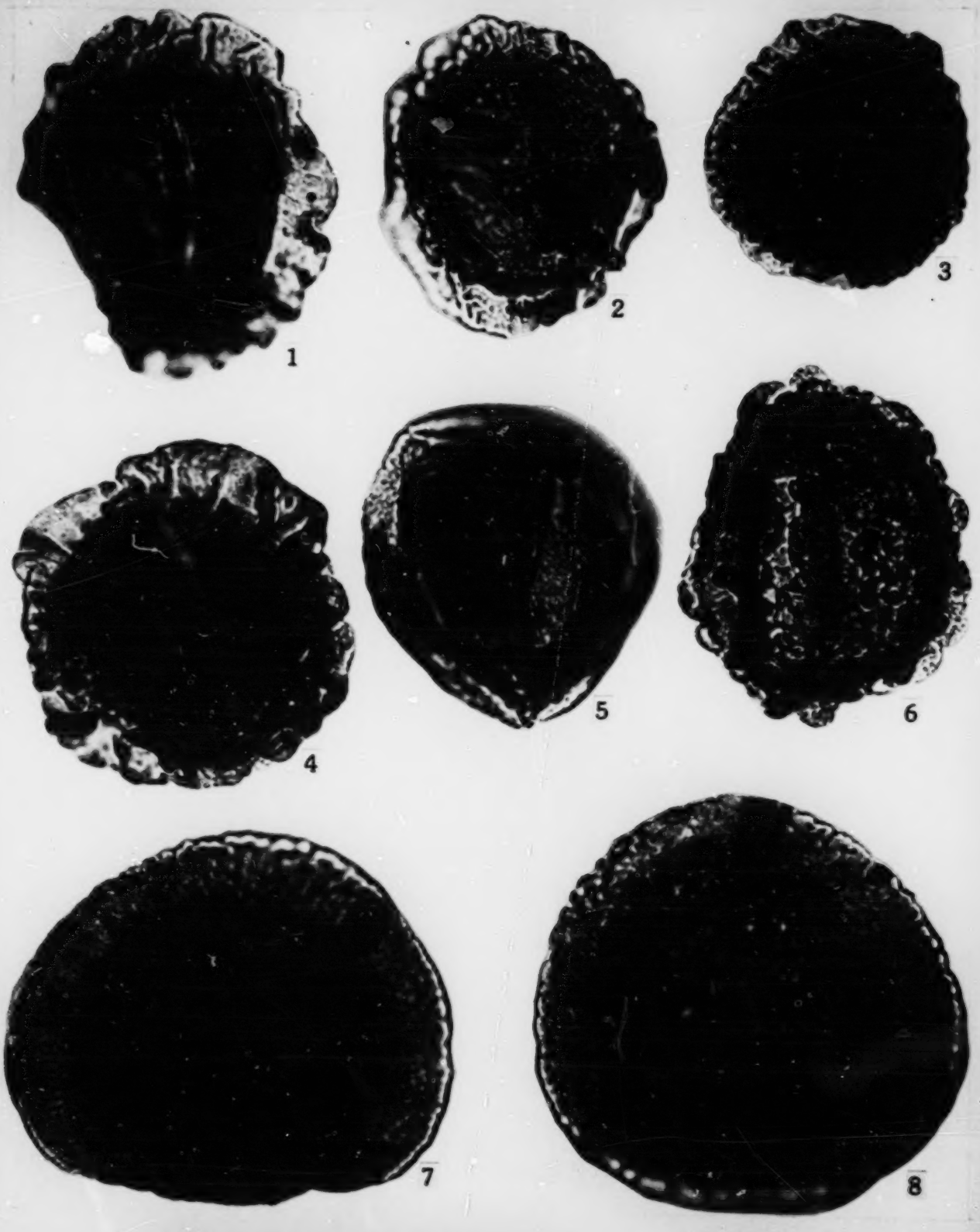

Plate 7

Plate 8

[Magnification X 1000]

Figure 1. Callialasporites sp. Sample D4931-A, slide 9, coordinates 85.2 x 15.9.

2. Couperisporites cf. C. jurassicus Pocock, 1970, Sample D4931-A, slide 1, coordinates 98.3 x 7.5.

3. Unidentified - perhaps laterally compressed view of Callialasporites sp. Sample D4931-A, slide 9, coordinates 86.2 x 14.4.

4. Unidentified - perhaps laterally compressed view of Callialasporites sp. Sample D4931-A, slide 1, coordinates 110.0 x 20.9

5. Unidentified - perhaps laterally compressed view of Callialasporites sp. Sample D4931-A, slide 9, coordinates 78.3 x 9.1.

6. Unidentified - perhaps laterally compressed view of Callialasporites sp. Sample D4931-A, slide 9, coordinates 78.3 x 9.1.

7. Unidentified - perhaps laterally compressed view of Callialasporites sp. Sample D4931-A, slide 8, coordinates 78.0 x 15.0.

8. Unidentified - perhaps laterally compressed view of Callialasporites sp. Sample D4931-A, slide 9, coordinates 90.8 x 13.9.

9. Unidentified - perhaps laterally compressed view of Callialasporites sp. Sample D4931-A, slide 8, coordinates 101.8 x 2.3.

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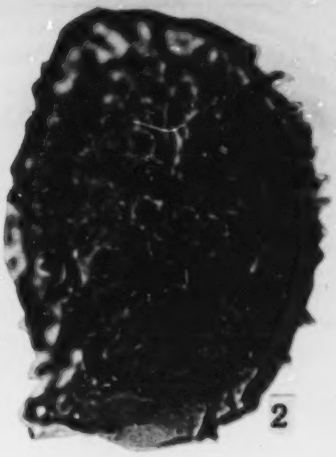
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Plate 8

Plate 9

[Magnification X 1000]

Figure 1. Corollina sp. Sample D4931-A, slide 8, coordinates 110.0 x 17.8.

2. Corollina sp. Sample D4931-A, slide 9, coordinates 111.3 x 17.3.

3. Corollina sp. Sample D4931-A, slide 8, coordinates 103.5 x 11.1.

4. Corollina sp. Sample D4931-A, slide 8, coordinates 114.2 x 4.3.

5. Exesipollenites tumulus Balme, 1957. Sample D4931-A, slide 1, coordinates 79.7 x 9.0.

6. Inaperturopollenites turbatus Balme 1957. Sample D4931-A, slide 8, coordinates 103.1 x 4.2.

7. Araucariacites australis Cookson 1947. Sample D4931-A, slide 8, coordinates 103.7 x 21.4.

8. Equisetosporites sp. Sample D4931-A, slide 9, coordinates 94.6 x 4.0.

9. Equisetosporites sp. Sample D4931-A, slide 9, coordinates 80.0 x 19.0.

10. Cycadopites sp. Sample D4931-A, slide 9, coordinates 89.9 x 7.5.

11. Ginkgocycadophytus sp. Sample D4931-A, slide 8, coordinates 107.6 x 19.2.

12. Cycadopites sp. Sample D4931-A, slide 8, coordinates 113.3 x 20.5.

13. Cycadopites sp. Sample D4931-A, slide 8, coordinates 114.2 x 4.5.

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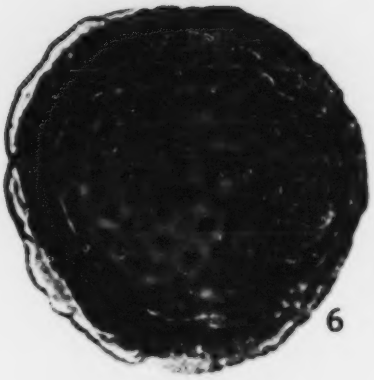

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Plate 9

References

Tschudy, R.H., 1966, Associated megaspores and microspores of the Cretaceous genus Ariadnaesporites Potonie , 1956, emend., in Geological Survey research 1966: U.S. Geol. Survey Prof. Paper 550-D, p. D76-D82.